

REMARKS

This is a response to the Office Action dated October 29, 2004.

In the outstanding Office Action the Examiner rejected Claims 1-7, 19-23, and 26-30 under 35 U.S.C. §103(a) as being unpatentable over JP 06271724 A, abstract ("*Japanese Abstract*"). Claims 8-24 and 26-30 were also rejected under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,912,070 ("*Miharu*") in view of the *Japanese Abstract*. Claim 25 was rejected under 35 U.S.C. §103(a) as being unpatentable over EP 849075 A2, abstract ("*Beer*"). All claims are believed to be in condition for allowance.

The present invention relates to heat sealable films having a layer that consists essentially of a cycloolefin copolymer ("COC" or "COCs") which has a glass transition temperature ("Tg" or "Tg's") of from about 30 to about 55 °C. The films of the present invention exhibit surprisingly good sealing characteristics at lower temperatures. Lower temperature sealability is desirable because it is amenable to many commercial processes and allows for high production speeds. The seal strength can be determined by the seal's hot tack strength and its ultimate seal strength. The seal strength of seals made from films of the present invention are unexpectedly strong at low sealing temperatures such as those sometimes encountered in a high speed packaging line. **Figure 1** of the pending application, below, illustrates this surprising result:

Figure 1

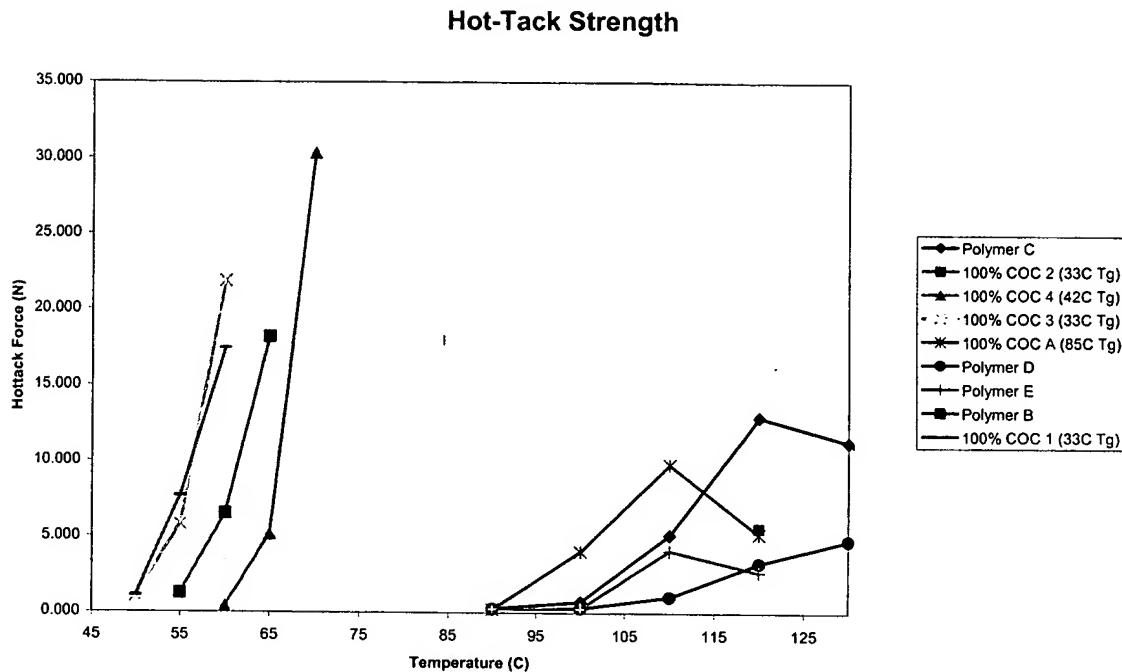
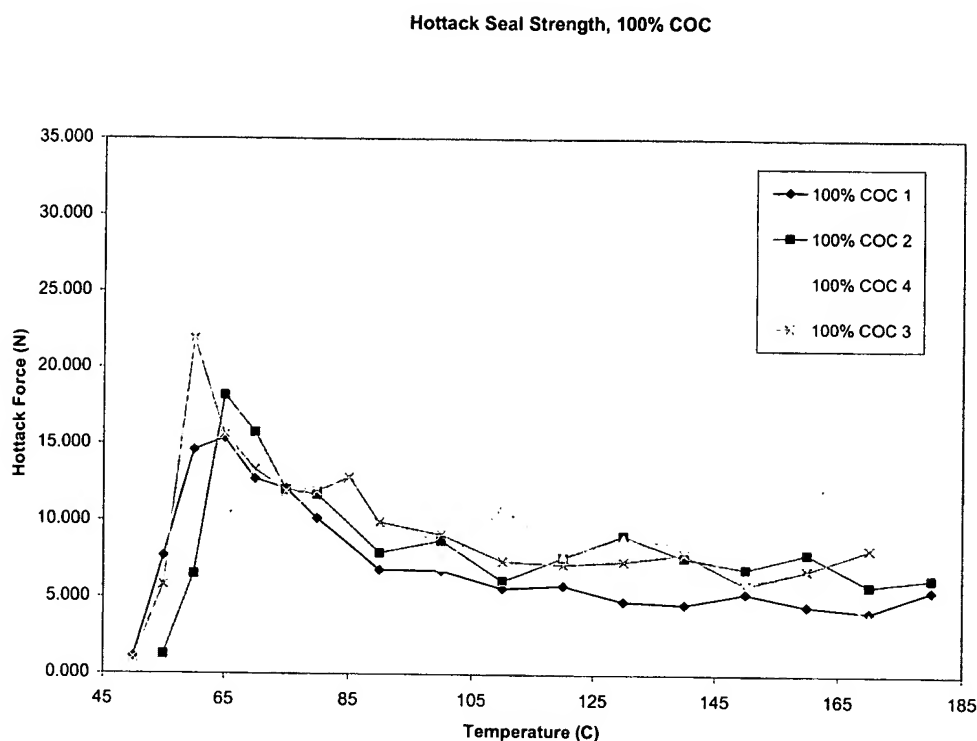


Figure 1 shows that the hot tack strengths of seals made from films of the present invention (left side, **Figure 1**) are significantly improved over other conventional films (right side, **Figure 1**), even at a lower temperature. And, the COC's used in the films of the present invention provide seals with much stronger hot tack strength than another COC with a higher glass transition temperature and have the added advantage that they can be sealed at low temperatures. **Figure 2** shows that ultimate seal strengths for films of the present invention at low temperatures are comparable to seal strengths of other films at high temperatures. The films of the present invention, therefore, have excellent seal strengths at low temperatures. Furthermore, the cyclic olefin copolymers used in present invention are uniquely suited for low temperature seal applications. **Figure 5** shows the relationship between hot tack strength and temperature for seals made with films according to the present invention:

Figure 5



The seals show a peak hot tack strength in the desired range for low temperature sealing films. Similarly, **Figure 6** shows suitable ultimate seal strengths in the desired temperature range. Thus, low temperature seals made with the films of the present invention show significant improvement over COC's with a higher T_g and other conventional polymers.

The seals made from films of the present invention also exhibit the unexpected characteristic of having much better seal strength at lower temperatures than films with other polymers blended in. **Figures 3 and 4** of the pending application illustrate that the low temperature heat seal properties of films made from low T_g COC's are vastly inferior when they are blended with other commercial polymers (other than the COC's of the present invention). When other polymers are blended with the COC's, the temperature at which good seal strength is achieved is much higher. Remarkably, this is true even when the cyclic olefin copolymer makes up 80 % of the blend. Thus, having at least one layer that consists essentially of a cycloolefin copolymer provides unexpectedly better results for low-temperature sealing applications.

Because the seals made from films of the present invention exhibit surprisingly good properties at low temperatures, all claims are believed in condition for allowance.

Turning specifically to the outstanding rejections, Claims 1-7, 19-23, and 26-30 were rejected under §103 as being obvious over the *Japanese Abstract*. The Examiner issued the rejection based on the reasoning that it would have been obvious at the time of the invention to employ copolymers having suitable glass transition temperatures and norbornene contents in the films of the *Japanese Abstract* to tailor the film's properties to the desired application. The claims are believed allowable because the *Japanese Abstract* does not suggest or teach that low temperature heat seals can be achieved using cyclic olefin copolymers with lower glass transition temperatures. The *Japanese Abstract* discloses cyclic olefin blends with Tg's of less than 70°C. While this includes the Tg range recited by the pending application, the *Japanese Abstract* does not remotely suggest that cycloolefin copolymers with Tg's from about 30 to about 55°C produce desirable films for heat sealing at low temperatures. Similarly, the *Japanese Abstract* does not teach that the norbornene content be present in an amount from about 24 to about 30 mole percent, as recited by Claim 30. Importantly, the *Japanese Abstract* does not at all suggest that glass transition temperature or norbornene content are predictive of heat seal properties such as heat seal temperature, hot tack strength, and ultimate seal strength. Indeed, comparing the example in the *Japanese Abstract* with the examples in the pending application suggests that heat sealing properties are unpredictable. The example in the abstract discloses a blend of two cyclic olefins having Tg's of 4°C and 0°C, respectively. The film made from this blend had a heat seal temperature of 85°C. The examples of the present invention disclose three samples whose Tg's were nearly 30 degrees higher than the example in the *Japanese Abstract* and formed good heat seals at temperatures of 75°C or lower (samples 40-42, pages 30-31 of the pending application). It would not be apparent from the *Japanese Abstract*, therefore, to employ cyclic olefin copolymers having lower Tg's in films suitable for heat sealing at lower temperatures.

Additionally, the *Japanese Abstract* fails to teach that the heat sealable film should have at least one layer *consisting essentially of* a cycloolefin copolymer as recited by independent Claims 1 and 26-29. The *Japanese Abstract* uses the open ended term "comprises" when referring to its composition of cyclic olefin blends, and does not teach the criticality of using a

layer consisting essentially of a cyclic olefin copolymer. As the pending application illustrates, when the low Tg cyclic olefins are blended with certain polymers; they are not suitable for low temperature heat sealing. Claims 1-7, 19-23, and 26-30, therefore, are believed allowable.

Claims 19-23 and 26-29 are believed independently patentable over the *Japanese Abstract*. Claims 19-23 and 26-29 recite properties of the seal strength such as hot tack strength and ultimate seal strength at certain sealing temperatures. As stated above, seals made from films of the present invention have strength values that are surprisingly high at low temperatures. The claims should be allowed because the *Japanese Abstract* does not teach or suggest that the films of the present invention would exhibit the heat seal properties recited in these claims.

Referring to the other rejections, Claims 8-24 and 26-30 are believed patentable over *Miharu* in view of the *Japanese Abstract*. The rejection was issued based on the reasoning that it would have been obvious at the time of the invention to employ the copolymers of the *Japanese Abstract*, or others with similar glass transition properties, in the laminates of *Miharu* to produce laminates having good elastic recovery. For the reasons discussed in part I above, it is believed all claims are allowable because the *Japanese Abstract* does not suggest using the films of the claimed invention for heat sealing at low temperatures. And, as stated above, Claims 26-29 should be independently allowable because the *Japanese Abstract* does not suggest films that would have the properties recited in these claims.

Additionally, *Miharu* teaches away from incorporating the cyclic olefin copolymers of the *Japanese Abstract* (or others with similar glass transition properties) with its laminates.

Miharu states in Col. 6:

50 The glass transition temperature (Tg) of the resin based on
cycloolefin to be used according to the present invention lies
desirably in the range of 60–120° C., preferably 65–110 C.
and more preferably 70–90° C. If the glass transition tem-
55 perature is in the above range, processing of the resin is easy,
so that a co-stretching with the thermoplastic polyester resin
(A) is possible, and the extension magnification in the
stretching can be increased, together with superior values of
modulus of elasticity and strength.

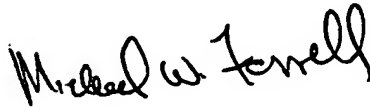
Thus, the cyclic olefin copolymers blends of the *Japanese Abstract*, which contain at least one cyclic olefin copolymer having a Tg less than 50°C, would not be suitable to combine with the laminates of *Miharu*. Furthermore, even if some of the cyclic olefins disclosed by the *Japanese Abstract* were suitable, the copolymers recited by the present invention have a Tg from about 30 to about 55°C which is outside the range of desirability to combine with the laminates of *Miharu*. *Miharu* claims that the higher Tg's allow stretching of the laminate, which increases heat resistance and shock resistance (Col. 1, lines 29-31). Also, one of the objects of *Miharu* is to provide a laminated film superior to heat and shock resistance (Col. 3, lines 7-12). Thus, according to the teaching of *Miharu*, combining the cyclic olefin copolymers of the *Japanese Abstract* would frustrate an intended purpose of *Miharu*. Because there is not a proper motivation to combine the references, it is believed that Claims 8-24 and 26-30 are allowable.

Finally, Claim 25 is clearly patentable over *Beer* because *Beer* does not teach that the cyclic olefin copolymers of the present invention may be heat sealed from a temperature of about 50 to about 80°C. The *Beer* reference discloses a sealable film containing a cyclic olefin copolymer where the sealing temperature is 5-70°C above the glass transition temperature. Although, the *Beer* reference may encompass a wide variety of cyclic olefin films, it does not teach a method of heat sealing polymers with a specific range of Tg's (about 30 to about 55°C) at low temperatures (about 50 to about 80°C) as disclosed by Claim 25. For the reasons discussed above, it is not at all obvious that the recited cyclic olefin copolymers would have desirable heat sealing properties at low temperatures. Thus, Claim 25 is believed patentable over *Beer*. Also, *Beer* discloses a film *containing* cyclic olefin copolymer, and does not suggest a film having a layer *consisting essentially of* a cyclic olefin copolymer as recited in Claim 25. Again, as stated above, having at least one layer consisting essentially of the cyclic olefin copolymer is not an obvious element in light of references which disclose films containing a cyclic olefin copolymer.

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All claims should be allowed, for the reasons discussed above.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Michael W. Ferrell". The signature is written in a cursive, flowing style.

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